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abruptly as if cut or bitten off, the hinder hypaxial and epaxial tissues concerned in the formation of rays and their supports are then approximated over the end of the aborted axis so as to form a continuous chain, and developed later than the other and more anterior median fin-rays (Mola), and the interval so bridged by a secondary process of development leads to the formation of what we may call a gephyrocercal tail, in which the spinous axial apophyses of the caudal vertebræ, together with their centra, fail to develop, and the caudal rays rest either upon interspinous elements alone, or even these may be almost entirely aborted, as is the case for a time in the young stages of Mola "*Ostracion boöps*" and "*Molacanthus*," both of which are evidently young, post-larval phases of that form.

The views here outlined rest partly upon facts of my own observation, but I must express my great indebtedness to the researches of L. and A. Agassiz, Vogt, Lotz, Balfour, Parker, Huxley and Kölliker, whose labors have enabled me to coördinate the facts and establish doctrines respecting the origin of the median fins, which are founded upon the theory of ontogeny.—*John A. Ryder. Nov. 3d, 1884.*

### EXPLANATIONS OF FIGURES.

FIG. 1.—Larval Branchiostoma, (after Kowalevsky); almost perfectly archicercal.

FIG. 2.—*Chimæra monstrosa*, with an archicercal opisthural filament, (after Agassiz).

FIG. 3.—Lophocercal larva of the codfish, with continuous median fin-fold, *f f f f*.

FIG. 4.—Ideal diphycercal tail, nearly as in Ceratodus and Protopterus.

FIG. 5.—Ideal archaic heterocercal tail, somewhat as found in sturgeons and sharks.

FIG. 6.—Heterocercal tail of larval Lepidosteus (after Balfour and Parker), showing epural and hypural pieces undeveloped at the end of the chorda.

FIG. 7.—Tail of a very young Lepidosteus (from the same source), showing the opisthure, *op*, above the secondary or true caudal, *sc*.

FIG. 8.—Caudal skeleton of a larval Amiurus, fifteen days old. *op*, opisthural, *hy*, hypural, and *cp*, epural cartilages; *u*, urostyle; *m*, medulla spinalis; *ch*, chorda, invested by the skeletal tissue, *sk*, of the caudal vertebræ.

## PHYSIOLOGY.[1]

THE THERAPEUTIC EFFECTS OF OXYGEN AND OF OZONE.—It is a popular error that breathing pure oxygen would prove destructive to animal life by greatly accelerating combustion in the body as it does of the fuel of an ordinary fire. Filipow has lately submitted the question of the physiological action of oxygen and ozone to exact experiment on men and dogs; his results may be summed up as follows: 1. Breathing pure oxygen is followed by no effects which distinguish its action from that of pure atmospheric air, at least as regards pulse, respiration and body temperature. 2. In cases of poisoning with chloroform, alcohol, sulphuretted hydrogen or carbonic oxide, respiration of pure oxygen offers no advantages over that of pure air. 3. Breathing in diluted ozone is without the narcotizing effects which some ascribe to it. 4. Respiration in concentrated ozone produces powerful irritation of the mucous membrane, and is therefore injurious. 5. There is no proof that ozone is taken into the blood through the lungs.—*Pflüger's Archiv., Bd. 34, S. 335.*

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[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Mich.

THE PRESENCE, SOURCE AND SIGNIFICANCE OF SUGAR IN THE BLOOD.—Seegen publishes an interesting contribution to the much discussed question of the function of the liver in relation to carbohydrates. As is well known, Bernard and his followers regarded the liver as the sugar-making organ, and went so far as to maintain that the sugar thus formed was produced chiefly by the disruption of albuminous material. Pavy and others regard, in general, the liver as a sugar destroyer, by whose means the overloading of the blood with absorbed carbohydrate is prevented. Seegen lends his support to the older school. He shows that sugar formation in the liver is a general physiological function shared by widely different groups of animals, herbivorous and carnivorous. He finds, moreover, that the liver, even when excised, has the power of producing sugar from peptone. Numerous researches on dogs gave the following principal results: 1. Sugar is a normal constituent of the blood, but varies in its proportions from 0.1 per cent to 0.15 per cent. 2. The sugar content of the blood in the right and left sides of the heart is the same. Differences between the proportion of sugar in arterial and venous blood are not constant but variable within narrow limits. The blood of the portal vein, however, nearly constantly contains less sugar than that of the carotid artery. 3. The blood which leaves the liver contains double the quantity of sugar held by that entering it. The mean of thirteen experiments gave for blood of the portal vein, sugar 0.119 per cent; for the hepatic vein, sugar 0.23 per cent. 4. The amount of sugar thus leaving the liver in the course of a day is very considerable. The amount produced by the dog's liver in twenty-four hours is calculated to vary from 200 to more than 400 grammes. 5. The blood-sugar is formed, at least in carnivorous animals, exclusively from albuminous bodies. 6. The sugar content of the blood rapidly diminishes when the liver is excluded. This sugar is used up in all the living tissues.—*Pflügers Archiv, Bd. 34, S. 388.*

THE PREVENTION OF HYDROPHOBIA.—MM. Pasteur, Chamberland and Roux have made the following communication on the prophylaxis of rabies by inoculation with a modified virus. They find (1) that the virus transferred from the dog to the ape, and cultivated by propagation through several members of the latter order, becomes progressively feebler after each inoculation. After a certain period of such cultivation, if it be hypodermically administered to dogs, guinea-pigs or rabbits, or even by intracranial injection (the most deadly method), death does not result, but the animal acquires an immunity from hydrophobia. (2) If, on the other hand, the poison of rabies be cultivated in successive rabbits or guinea-pigs only, its potency is intensified, and after a time is so great that a fatal issue invariably follows its inoculation. The poison as found in the dog is intermediate in strength between that of the two methods of cultivation just mentioned. Thus by careful selection of the medium and the stage of cultivation, it is possible to accumulate a store of attenuated virus which can be relied on to communicate a modified rabies whose inoculation shall be protective against its severer forms, as that of vaccinia is against variola. There is also good reason to believe, though the actual experiment is postponed, that, as with vaccinia, the modified poison hypodermically engrafted immediately after the bite of a rabid animal, will forestall, by the speed of its development, the symptoms due to the bite. No experiments have as yet been made on the human subject. (*Progrès Médical*, May, 1884). The experiments which M. Pasteur is reported thus far to have made are said to be an unbroken success. Fifty-seven dogs have been the subjects of investigation. Of these, nineteen were rabid, and by these, thirty-eight healthy animals were bitten under uniform conditions. Of the thirty-eight, one-half the number had been previously inoculated or "vaccinated" with attenuated virus, the other half had not. The latter, without a single exception, died with unequivocal signs of rabies, whereas the nineteen others remain as well as ever. They will be watched for a year by veterinary surgeons to see whether the inoculation holds good permanently or only temporarily. If rabies be not spontaneous in its origin, and if the experiments of Pasteur all turn out successful, there seems no reason why canine madness should not be extirpated from our midst.—*Lancet, July 12, 1884.*

## PSYCHOLOGY.

CLEVENGER ON THE EVOLUTION OF MIND AND BODY OF MAN AND ANIMALS.[1]—We have here a work, scientific and speculative, on several of the live questions of the day. The author is an evolutionist physical and metaphysical. More than this, he is a mechanical evolutionist, and endeavors throughout the book to prove the origin of structures through use and effort, and their loss by disuse. The especial object of the discussion is to demonstrate the origin of mind and its various departments by the action of its material basis. From this process he does not exclude consciousness as a necessary factor. When he comes to the origin of consciousness, the author writes as follows (p. 18): "The amœba's functions are simple, but nevertheless the same as

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[1] Comparative Physiology and Psychology, by S. V. Clevenger, M.D., Chicago, Jansen McClurg & Co., 1885, pp. 247.